Fact Sheets and Information Papers

Antifreeze Recycling

April 2006

BACKGROUND. The main reasons to recycle used antifreeze are to reduce to cost of purchasing new coolant, to reduce the cost of disposing of used antifreeze, and to conserve resources. In addition, a growing number of state and local governing agencies are enacting increasingly stricter regulations regarding the handling and disposal of substances such as ethylene glycol (a major component of most antifreeze in use today). As a result, recycling and reuse will help ease the regulatory burdens associated with using and disposing of antifreeze. Under federal procurement guidelines resulting from Executive Order 13101 and the Federal Acquisition Regulation, it is recommend that federal fleet managers establish a program for antifreeze recycling that consists of reclaiming spent antifreeze on-site or establishing a service contract for recycling it off-site.

RECYCLING EQUIPMENT. Various kinds of recycling units are available which are able to recover spent coolant for reuse. While different recycling units may use different types of technologies to accomplish this, coolant recycling basically involves removing contaminants and restoring the coolant's properties with additives. It is important to note that while many recycling units are able to restore commercial grade coolant back to its original specifications, only a few are effective in restoring coolant to military specifications. Therefore, before purchasing a recycling unit, one must determine whether it will be used to service commercial vehicles or tactical vehicles.

COMMERCIAL VEHICLES. Typically, any recycling unit available would be acceptable for recovering used antifreeze for reuse in commercial vehicles. Chrysler, Ford, General Motors and a majority of import manufacturers have approved coolant recycling, provided the recycled coolant meets their quality specifications and/or the American Society of Testing Materials (ASTM) standards. Most vehicle manufacturers list specific machines that have been tested and approved as meeting their requirements, so check with the manufacturer or dealer to determine which coolant recycling equipment or process is appropriate. Before purchasing any equipment, examine the warranties of the vehicles to be serviced. Although the recycled antifreeze may be suitable for use in the vehicle, the warranty may have provisions that exclude certain coverage if the owner uses recycled antifreeze. Such exclusions are probably unlikely, but examining the warranty beforehand is the only way to be sure. During the engine's warranty period, the manufacturer's instructions as to the use, or non-use, of recycled antifreeze takes priority.

TACTICAL VEHICLES. In 1993 the Belvoir Research, Development, and Engineering Center (BRDEC) [now the Fuels and Lubricants Technology Team (FLTT) of the U.S. Army Research, Development and Engineering Command (RDECOM) Tank-Automotive Research, Development, and Engineering Center (TARDEC), Warren, Michigan] initially performed an investigation to determine the potential for commercially available recycling units to process used antifreeze and return it to the Military Specifications stated in MIL-A-46153 (Single

Package, Heavy Duty, Inhibited Ethylene Glycol Antifreeze). In 1997, Commercial Item Description (CID) A-A-52624 (Antifreeze, Multi-Engine Type) was adopted to replace Military Specifications MIL-A-46153 and MIL-A-11755 (Arctic-Type Antifreeze).

Of the recycling units tested by BRDEC, only two have been shown to produce recycled antifreeze that meet the requirements of the specification for CID A-A-52624. These units are the KFM, LLC Coolant Purification System (formerly the BG Products Inc. Cool'r Clean'r Recycling System) which uses ion exchange technology, and the Finish Thompson, Inc. BE Series Recycler, which uses vacuum distillation technology. The results of this investigation have been published by REDCOM-TARDEC (*Antifreeze Recycling User's Guide*, March 2005) and can be obtained by contacting the FLTT at (586) 574-4219.

Using other recycling systems, services, or products may not adequately recycle CID A-A-52624 antifreeze or may produce a product that is not compatible with CID A-A-52624 antifreeze. These incompatibilities may lead to increased cooling system maintenance and possible premature failure of water pumps, heater cores, and other cooling system components.

ENVIRONMENTAL ANALYSIS. The ion exchange unit does not produce any liquid hazardous waste residue; however, it does require filter replacement. Spent filters accumulate metals and may be considered hazardous waste when disposed. Once the ion exchange filters are spent they must be shipped back to the manufacturer for regeneration. The spent filters are not generally treated as a hazardous waste since they are re-used after regeneration and are not disposed.

Distillation systems produce larger quantities of waste residue than do ion exchange units. Residue production by distillation systems is approximately 3 gallons of residue per 75 gallons of spent antifreeze. This residue may be hazardous waste since the lead contamination is often greater than 5 ppm and a Toxicity Characteristics Leaching Procedure (TCLP) analysis must be performed to determine whether the waste has this hazardous characteristic.

ECONOMIC ANALYSIS. The following economic analysis uses assumptions and estimates and is intended to provide only a basic evaluation of the potential payback period of antifreeze recycling. The average cost of procuring a recycling unit capable of meeting military specifications is approximately $10,000. The cost to recycle used antifreeze is estimated as $4 per gallon (which includes the cost of additives, maintenance, replacement filters, etc.). The cost of purchasing new antifreeze is approximately $6 per gallon. As a result, using recycled antifreeze instead of purchasing new antifreeze can save $2 per gallon. Therefore, recycling 1,000 gallons of antifreeze per year would result in an annual savings of $2,000 (1,000 gal x $2/gal) and a payback period of 5 years ($10,000 divided by $2,000/yr).

PROCUREMENT INFORMATION. For each TARDEC-recommended recycling unit, the following table provides the model number, the manufacturer's name and number, the national stock number, and the approximate purchase price [units are available through the General Service Administration (GSA) and through the Defense Logistics Agency (DLA)].

Coolant Recyclers Approved by the BRDEC

Model	Manufacturer	NSN	Price
BE-55C (55 gallon capacity)	Finish Thompson Inc. 921 Greengarden Road Erie, PA 16501 Phone: (814) 455-4478 Fax: (814) 455-8518 Toll Free: (800) 934-9384 www.finishthompson.com	4250-01-387-2551	$11,152 (GSA) $14,286 (DLA)
CC1 Coolant Purification System (Formerly BG Products Cool'r Clean'r) 1 set of deionization tanks	KFM, LLC 506 Camson Road Anderson , SC 29625 Phone: (800) 736-1404 Fax: (864) 224-6601 www.kfmllc.com	4250-01-380-9047	$6,925 (GSA) $9,952 (DLA)
CC2 Coolant Purification System (Formerly BG Products Cool'r Clean'r) 2 sets of deionization tanks	KFM, LLC 506 Camson Road Anderson , SC 29625 Phone: (800) 736-1404 Fax: (864) 224-6601 www.kfmllc.com	4250-01-380-9034	$8,350 (GSA) $11,541 (DLA)

The recommendations given in this paper relative to use of the recycling systems listed are not meant as an endorsement of any recycling system, but are provided to identify the commercially-available recycling systems that were found to produce an acceptable quality of recycled military antifreeze, CID A-A-52624. If other systems can be demonstrated to produce satisfactory military antifreeze using the protocol established in the TARDEC-RDECOM *Antifreeze Recycling User's Guide*, March 2005, then those systems may be included in that guide and recommended for use.

The POC for this paper is Mr. Dennis Poyer, Environmental Scientist, DSN 584-3651 or Commercial (410) 436-3651.

Back to Fact Sheet Index